

1.3 Solving Linear Systems by Elimination

Solve the following system of equations:

$$\begin{array}{r} 17x + 23y = 35 \\ +26x - 23y = -121 \end{array}$$

$$\begin{array}{r} 43x \quad = -86 \\ \hline 43 \quad \quad 43 \\ x = -2 \end{array}$$

$$+23y + (-23y) = 0$$

Solve the following system of equations:
(try adding them together)

$$\begin{array}{r} 17x + 23y = 35 \\ 26x - 23y = -121 \\ \hline \end{array}$$

1.3 Solving Linear Systems by Elimination

Steps:

1. Write equations in the same form: $Ax + By = C$
 $y = mx + b$
2. Look for the coefficients of one of the variables to be the same (sign does not matter).
3. If necessary, multiply one or both equations by a whole number to achieve step 2.
4. a) Same coefficient, same sign: **subtract**
b) Same coefficient, opposite sign: **add**.
5. Solve the resulting equation.
6. Substitute to find the value of the other variable.

Ex.1 Solve: $x + y = 60$ $x - y = 8$

$$\begin{array}{r}
 \textcircled{1} \quad x + y = 60 \\
 + \textcircled{2} \quad x - y = 8 \\
 \hline
 2x = 68 \\
 \frac{2x}{2} = \frac{68}{2} \\
 x = 34
 \end{array}$$

Sub $x = 34$ into $\textcircled{1}$

$$\begin{array}{r}
 x + y = 60 \\
 34 + y = 60 \\
 y = 60 - 34 \\
 y = 26
 \end{array}$$

\therefore the POI is $(34, 26)$

Ex.2 Solve $5x + 2y = 5$

$$3x = -23 + 4y$$

$$\textcircled{1} (5x + 2y = 5) \times 2$$

$$\textcircled{2} 3x - 4y = -23$$

$$\textcircled{1} 10x + 4y = 10$$

$$\textcircled{2} 3x - 4y = -23$$

$$\begin{array}{r} 10x + 4y = 10 \\ 3x - 4y = -23 \\ \hline 13x = -13 \\ \frac{13x}{13} = \frac{-13}{13} \\ x = -1 \end{array}$$

 \therefore The POI is $(-1, 5)$

$$\begin{array}{l} \text{Rearrange} \\ 3x - 4y = -23 \end{array}$$

Sub $x = -1$ into $\textcircled{1}$

$$\begin{array}{l} 5x + 2y = 5 \\ 5(-1) + 2y = 5 \\ 2y = 5 + 5 \\ 2y = 10 \\ \frac{2y}{2} = \frac{10}{2} \\ y = 5 \end{array}$$

Ex.3

$$\left(\frac{x}{2} + \frac{y}{8} = 4 \right) \times 8 \quad \left(\frac{x}{3} - \frac{y}{2} = -2 \right) \times 6$$

$$4x + y = 32 \quad (2x - 3y = -12) \times 2$$

$$\textcircled{1} 4x + y = 32$$

$$- \textcircled{2} 4x - 6y = -24$$

$$\begin{array}{r} 4x + y = 32 \\ - (4x - 6y = -24) \\ \hline 7y = 56 \\ \frac{7y}{7} = \frac{56}{7} \\ y = 8 \end{array}$$

 \therefore The POI is $(6, 8)$ Sub $y = 8$ into $\textcircled{1}$

$$\begin{array}{l} 4x + y = 32 \\ 4x + 8 = 32 \\ 4x = 32 - 8 \\ 4x = 24 \\ \frac{4x}{4} = \frac{24}{4} \\ x = 6 \end{array}$$

Assigned Work:

p.54 # 1, 4, 6odd, 11odd, 20*